Headquarters U.S. Air Force

Integrity - Service - Excellence

The USGBC LEED™ Rating System – What, Why and How

U.S. AIR FORCE

Air Force Architects Workshop

8 June 2004

What Is LEED™?

Leadership in Energy & Environmental Design

A leading-edge system for designing, constructing, and certifying the world's greenest buildings, created by the U.S. Green Building Council

U.S. AIR FORCE

Why was LEED Created?

Environmental Impacts of Commercial and Residential Buildings:

- 65.2% of total U.S. electricity consumption
- >36% of total U.S. primary energy use
- 30% of total U.S. greenhouse gas emissions
  - U.S. buildings are responsible for more CO2 emissions than those of any other country in the world except for China
- 12% of potable water use in the U.S.
- 40% (3 billion tons annually) of raw materials use globally
- Construction and demolition waste - 2.8 pounds per person per day in U.S., as compared to 4.3 lbs per person per day for all other types of municipal trash

Sources: USGBC LEED™ Introductory Briefing, 1998 EPA solid waste study and 2003 Capital E Study

U.S. AIR FORCE

Indoor Environmental Quality

- **People spend 90% of their time indoors**
  - **The concentration of pollutants indoors is typically higher than outdoors, sometimes by as much as 10 or even 100 times**
- **Indoor pollutants come from:**
  - **Building materials (adhesives and sealants, paints, carpets, composite woods)**
  - **Outdoor sources (air intakes next to exhaust sources such as parking garages)**
  - **Indoor sources (copier rooms, cleaning products)**

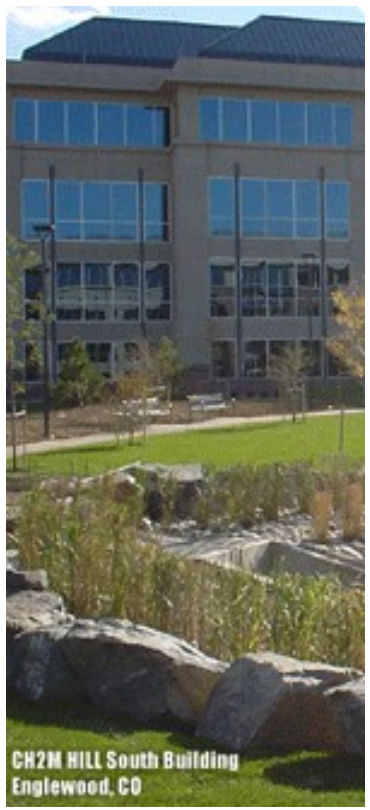
Source: EPA, "Indoor Air Quality", 2003

U.S. AIR FORCE

LEED™ Provides Solutions…

As cited in USGBC's LEED™ Introductory Briefing:

- **Environmental Benefits**
  - **Reduce the impacts of natural resource consumption**
- **Health and Safety Benefits**
  - **Enhance occupant comfort and health**
- **Economic Benefits**
  - **Improve the bottom line**
- **Community Benefits**
  - **Minimize strain on local infrastructures and improve quality of life**



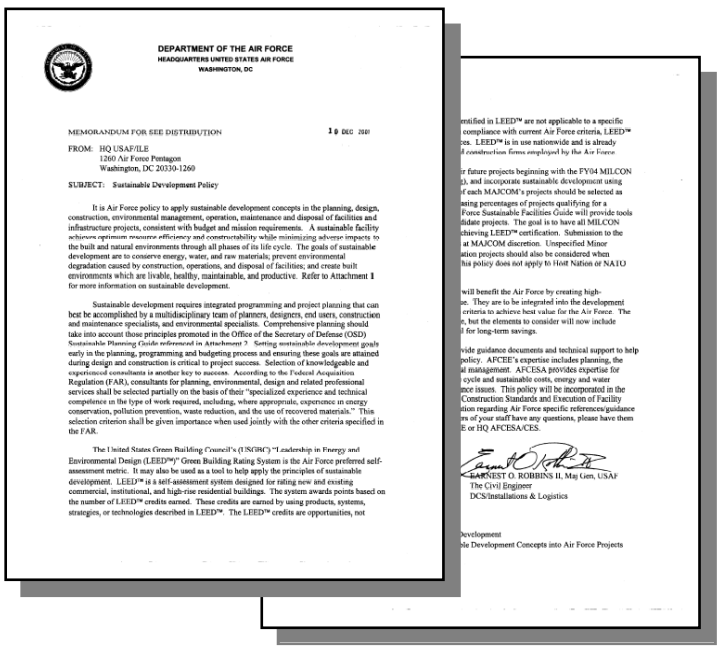
U.S. AIR FORCE

...and LEED™ is in USAF ~~Policy~~

AF Civil Engineering policy letter - 19 Dec 0

"It is Air Force policy to apply sustainable concepts in the planning, design, construction, environmental management, operation, maintenance and disposal of facilities and infrastructure projects, consistent with budget and mission constraints."

- **LEED™ is identified as the AF-preferred self-assessment metric**
- **Goal: All MILCON projects in the FY09 program capable of achieving LEED™ certification, starting with 20% of each command's FY04 projects**



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, DC

MEMORANDUM FOR SEE DISTRIBUTION

FROM: HQ USAF/ILE
1260 Air Force Pentagon
Washington, DC 20330-1260

SUBJECT: Sustainable Development Policy

It is Air Force policy to apply sustainable development concepts in the planning, design, construction, environmental management, operation, maintenance and disposal of facilities and infrastructure projects, consistent with budget and mission requirements. A sustainable facility achieves optimum resource efficiency and constructability while minimizing adverse impacts to the built and natural environments through all phases of its life cycle. The goals of sustainable development are to conserve energy, water, and raw materials; prevent environmental degradation caused by construction, operations, and disposal of facilities; and create built environments which are livable, healthy, maintainable, and productive. Refer to Attachment 1 for more information on sustainable development.

Sustainable development requires integrated programming and project planning that can best be accomplished by a multidisciplinary team of planners, designers, end users, construction and maintenance specialists, and environmental specialists. Comprehensive planning should take into account those principles promoted in the Office of the Secretary of Defense (OSD) Sustainable Planning Guide referenced in Attachment 2. Setting sustainable development goals early in the planning, programming and budgeting process and ensuring these goals are attained during design and construction is critical to project success. Selection of knowledgeable and experienced consultants is another key to success. According to the Federal Acquisition Regulation (FAR), consultants for planning, environmental, design and related professional services shall be selected partially on the basis of their "specialized experience and technical competence in the type of work required, including, where appropriate, experience in energy conservation, pollution prevention, waste reduction, and the use of recovered materials." This selection criterion shall be given importance when used jointly with the other criteria specified in the FAR.

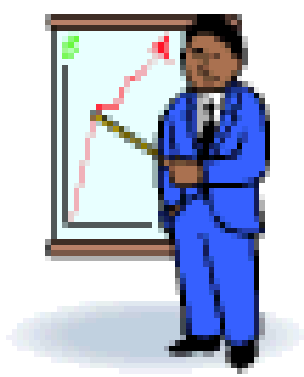
The United States Green Building Council's (USGBC) "Leadership in Energy and Environmental Design (LEED™)" Green Building Rating System is the Air Force preferred self-assessment metric. It may also be used as a tool to help apply the principles of sustainable development. LEED™ is a self-assessment system designed for rating new and existing commercial, institutional, and high-rise residential buildings. The system awards points based on the number of LEED™ credits earned. These credits are earned by using products, systems, strategies, or technologies described in LEED™. The LEED™ credits are opportunities, not

Application for actual LEED™ certification is at MAJCOM discretion

U.S. AIR FORCE

USAF Approach to LEED™

- **Use LEED™ to measure project sustainability**
  - **20% of new facilities in 2004 are "pilot projects"**
  - **Increasing numbers of new projects each year will be capable of achieving LEED™ certification**
- **But the actual certification process is not mandatory**
  - **Certification requires extra documentation and an application fee; MAJCOM decision.**
- **Not every LEED™ credit applies to every project - and that's**
  - **Choose the ones that fit your project**



"What gets measured... gets done."

U.S. AIR FORCE

Panic Attack!

Do I *have* to be *Sustainable*?

It's going to bust the budget and take more time and it can't be worth the effort…

U.S. AIR FORCE

There Is Some Good News

2003 Study conducted by The Capital E Group for the State of California: Competitive first costs were shown for 33 buildings studied

- 25 office buildings and 8 schools from across the U.S.
  - Chosen because cost data for both actual green design and conventional design was available for the same building
- On average, the premium for green buildings is about 2%
- This investment would, on average, result in life cycle savings of 20% of the total construction costs
- Benefits were found in lower energy, waste and water costs, lower environmental and emissions costs, lower O&M costs, and increased productivity and health

Source: USGBC Press Release, 10/17/03 and Capital E Study

U.S. AIR FORCE

Level of Green Standard and Average Green* Cost Premium

Level of Green Standard	Average Cost Premium
Level 1 – Certified (8 buildings)	0.66%
Level 2 – Silver (18 buildings)	2.11%
Level 3 – Gold (6 buildings)	1.82%
Level 4 – Platinum (1 building)	6.50%
Average of 33 Buildings	1.84%

** Green costs include design costs and construction costs*

Source: USGBC, Capital E analysis, 2003

U.S. AIR FORCE

Example AF Project Costs

- **AFRC estimates: additional A-E costs range from $8K to $24K**
  - **Paying for learning curves – eventually these efforts will be part of design and not add-ons**
- **Aeromedical Evacuation Unit, Minneapolis, FY04 AFRC project, PA $3,700,000**
  - **Additional design cost for Certified is $37,280 (1.0%)**
  - **Additional design cost for Silver is $40,960 (1.1%)**
- **Construction contractor additional costs for AFRC projects are ranging from $10K to $40K**
  - **The majority of cost increases seem to be for verifying LEED acceptability of materials, and record keeping**

U.S. AIR FORCE

Cost Management Strategies

- Determine if the project is right
- Set a clear goal early
- Write contracts and RFPs clearly
- Select a team with experience
- Encourage team members to train
- Use an integrated design process
- Educate the decision makers
- Manage time carefully
- Look for rebates and incentives
- Understand commissioning and energy modeling

Source: HQ ACC CEC PMR Briefing

U.S. AIR FORCE

The Ultimate Green Building Project?

U.S. AIR FORCE

The Focus of LEED™

Design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants.

These practices are divided into six categories:

- **Site conservation and sustainable planning**
- **Water efficiency and safeguarding water quality**
- **Energy efficiency and renewable energy**
- **Materials and resource conservation**
- **Indoor Environmental Quality – the effect on occupants**
- **Process & Innovation credits for unique accomplishment**

Credits are earned in each area – you total up your points for an overall score (Certified, Silver, Gold, Platinum)

U.S. AIR FORCE

Structure of the LEED™ Credits

Each credit identifies the following:

- **Intent -** *The performance basis for the requirements*
- **Requirements -** *What must be done to earn the credit*
- **Submittals** *- Documentation required by USGBC*
- **Technologies and Strategies -** *Recommended practices to fulfill the requirement and earn the points for that credit*
- **There are also several mandatory prerequisites that must be achieved before earning any credits**
  - **The AF has added some prerequisites to ensure compliance with laws affecting Federal projects, such as NEPA and cultural resource protection**
  - **These are listed in the AF Sustainable Facilities Guide http://www.afcee.brooks.af.mil/dc/dcd/arch/rfg/index.html**

U.S. AIR FORCE

LEED™ Scoring System

Credits	Points	Category
7	None	Prerequisites
8	14	Sustainable Sites
3	5	Water Efficiency
6	17	Energy and Atmosphere
7	13	Materials and Resources
8	15	Indoor Environmental Quality
--	4	Process and Innovation Credits
--	1	Use a LEED Professional

69 TOTAL POINTS AVAILABLE

26 points = LEED™ Certified; 33 points = Silver rating; 39 points = Gold rating; 52 points = Platinum rating

U.S. AIR FORCE

LEED-NC Fee Summary

	Less than 75,000 SF	75,000 – 300,000 SF	More than 300,000 SF
	Fixed Rate	Based on Square Ft.	Fixed Rate
Registration			
Members	$750.00	$0.01 per SF	$3,000.00
Non-Members	$950.00	$0.0125 per SF	$3,750.00
Certification			
Members	$1,500.00	$0.02 per SF	$6,000.00
Non-Members	$1,875.00	$0.025 per SF	$7,500.00

U.S. AIR FORCE

LEED-NC Certification Process

A three step process:

- **Step 1: Project Registration**
  - **Gain access to LEED™ Letter Templates (version 2.1), Credit Inquiries and Rulings (CIR), and on-line project listing**
- **Step 2: Prepare Documentation**
  - **Compile on CD for LEED 2.1 Letter Template submittal**
- **Step 3: Building Certification**
  - **Upon documentation submittal and USGBC review**

It is Air Force policy that MILCON projects will be *certifiable*, but not necessarily be *certified*

  - ***Certifiability* is determined by the MAJCOM from information provided by the A-E in the Design Analysis**
  - **Must include in the A-E Statement of Work**

U.S. AIR FORCE

Barksdale Fitness Center Sustainable Features

First and only USAF LEED Certified Facility: Applied for 27 credits

- ✓ Landscaping to reduce heat islands
- o Exterior design to reduce heat islands **(criteria not met)**
- o Infill development **(didn't meet base density)**
- ✓ Alternative transportation: bike racks & electric vehicle charging station
- ✓ Building commissioning: verification of design intent
- ✓ Energy efficiency: 22% > ASHRAE 90.1 & heat recovery
- ✓ Storage and collection of recyclables
- ✓ Recycled content building materials
- ✓ Construction waste: 75% diversion from landfill
- ✓ Indoor air quality: low VOC paints, adhesives, sealants
- ✓ Construction IAQ management plan
- ✓ Rainwater harvesting for flushing toilets and urinals
- ✓ LEED™ certified designer

U.S. AIR FORCE

ACC: Issues for Follow-Up

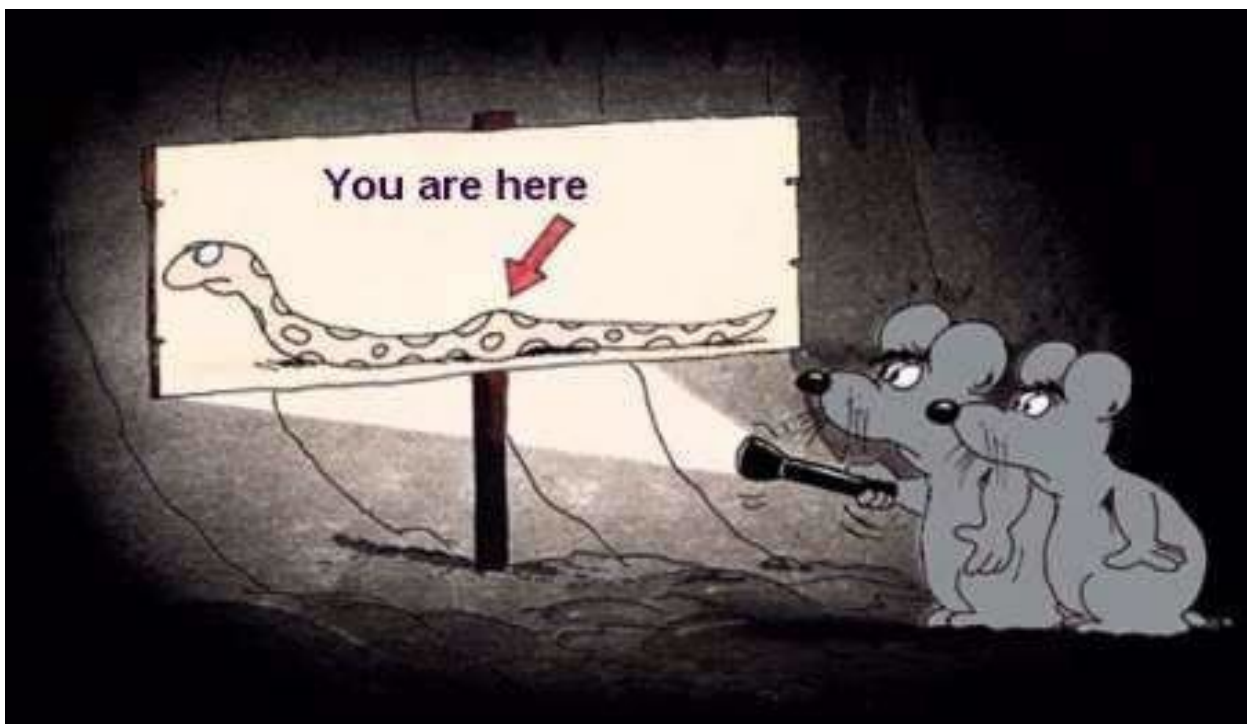
- **Energy and Water Use**
  - **Are meter readings used to compare estimated water use and energy budget with actual usage?**

- **Transportation**
  - **At Barksdale, the charging station was installed but then no electric vehicles were used**
  - **Base added more parking rather than encouraging walking**
- **Operations & Maintenance Issues**
  - **Do custodians use "green" cleaning solvents and recycle wastes?**
  - **At Barksdale, collected rainwater colored by pollen; system was shut off**

Source: HQ ACC CEC PMR Briefing

Humor Break

We’re halfway there …



U.S. AIR FORCE

Current and Future LEED™

- The current version, LEED 2.1, has been re-named LEED™ for New Construction (LEED-NC) and it continues to evolve
- New LEED™ product development includes
  - LEED for Existing Buildings (LEED-EB)
  - LEED for Commercial Interiors (LEED-CI)
  - LEED for Core & Shell (LEED-CS)
  - LEED for Neighborhood Development (LEED-ND)
  - LEED Homes
  - LEED-NC Version 3.0
  - Application Guides for various facility types

U.S. AIR FORCE

LEED-NC is Evolving

- Version 2.1 streamlined the application process
- Version 2.2 will fix known problems, clarify intent of selected credits, and clarify performance standards
  - Balloting in 2004, rules will take effect in 2005
- Version 3.0 will include “substantial differences”
  - It will incorporate Life Cycle Analysis - LCA (not to be confused with Life Cycle Costing)
    - LCA is the analysis of the environmental impacts a product has, over its entire life cycle from resource extraction through manufacturing, transportation, use, and recycling or disposal
  - Other than that, no decisions have been made since version 3 is in the beginning stages of development
  - It is expected to be released in 2005

U.S. AIR FORCE

LEED-EB Scope

- **LEED for Existing Buildings addresses O&M:**
  - **whole-building cleaning and maintenance issues including chemical use**
  - **ongoing indoor air quality**
  - **energy efficiency**
  - **water efficiency**
  - **recycling programs and facilities**
  - **exterior maintenance programs, and**
  - **systems upgrades to meet green building energy, water, IAQ, and lighting performance standards**

- **Designed to complement LEED-NC by focusing on sustainable operations over the life cycle**

LEED-EB Applicability & Schedule

- **Applicability**
  - **Existing buildings that are seeking LEED™ Certification for the first time**
  - **Projects previously certified under LEED™ standards for new construction**
- **Schedule**
  - **The pilot test is winding down – applicants still being**
  - **The final version should be approve later this summer**
  - **Reference guide will be updated an training workshops start in fall 200**

U.S. AIR FORCE

LEED-CS Scope

- LEED™ for Core and Shell covers base building elements for speculative office buildings
  - Structure and envelope
  - Building-level systems such as central HVAC
- To evaluate building projects where the owner <u>does not</u> control the interior design and fit-out
  - Owners who control both will need to use LEED-NC
- Allows for pre-construction “pre-certification”, for enhanced marketing to prospective tenants
  - Final certification still occurs after construction

All certifications occur after construction

U.S. AIR FORCE

LEED-CS Applicability & Schedule

- **Applicability**
  - **Base building prior to interior fit out**
  - **LEED-CS complements LEED-Commercial Interiors (CI) – together, they establish criteria for developers, designers and tenants**
- **Schedule**
  - **The pilot test is underway – applications are being accepted by USGBC (see www.usgbc.org)**
  - **LEED-CS is expected to be released for general usage in 2005**

U.S. AIR FORCE

LEED-CI Scope

- **LEED for Commercial Interiors addresses:**
  - **selection of sustainable tenant space**
  - **efficiency of water usage**
  - **energy performance optimization including lighting and lighting controls**
  - **resource utilization for interior building systems and furnishings**
  - **indoor environmental quality including comprehensive emissions criteria**

- **Use LEED-CI for fit out of new building interiors, and for projects to upgrade existing interiors**

U.S. AIR FORCE

LEED-CI Applicability & Schedule

- **Applicability**
  - **Building interiors**
  - **LEED-CI complements LEED-Core & Shell (CS) – together, they establish criteria for developers, designers and tenants**
- **Schedule**
  - **The pilot test is complete and included 95 buildings – 14% were from the Federal government**
  - **The final version is in development**
  - **LEED-CI is expected to be released for general usage in November or December of 2004**

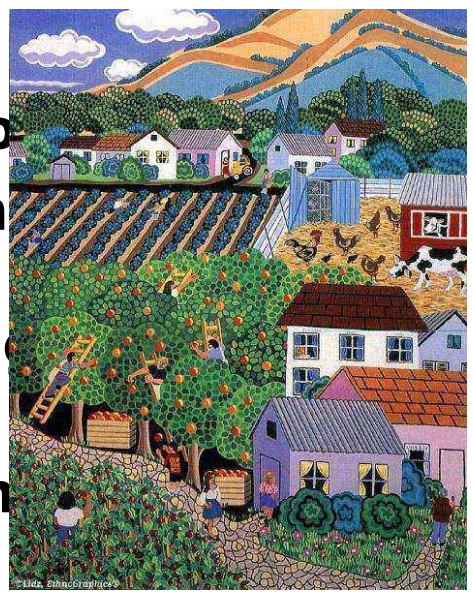
U.S. AIR FORCE

LEED-Homes

- **LEED-H will be a national system**
  - **To be used where a system doesn't exist (there are already over 20**
  - **Where a local system exists, USGBC will collaborate; seeking "mutual ben**
- **A USGBC committee is developing a business plan for LEED-H development**
  - **A draft rating system is available on the Web; the final system will be developed by a consultant**
  - **Focus is on creating opportunities for collaboration, and ensuring a cohesive and influential national system**
  - **The pilot is anticipated for mid-2005 to mid-2006**

LEED-ND

- **LEED™ for Neighborhood Developments**
  - **A partnership effort by USGBC, Congress for the New Urbanism, and the Natural Resources Defense Co**
  - **LEED-ND will emphasize smart growth aspects of development while still incorporating important green buildin practices**
  - **Will address density, proximity to tran mixed use, mixed housing type, pedestrian and bicycle friendly design**



- **This system is in the concept stage and is anticipated to be released in 2006**

U.S. AIR FORCE

LEED Application Guides

Guides for applying LEED™ to certain facilities:

- **Air Force Lodging/low-rise multi-family** (complete)
- **Retail** (Draft for public comment out by September)
- **Healthcare** (Draft should be out by November)
- **Laboratories** (Draft should be out by November)
- **Multiple Buildings** (Draft in work; USGBC Steering Committee to decide if it will be balloted or pilot-tested)
- Other guides to follow:
  - Industrial
  - Airports

Technical Support

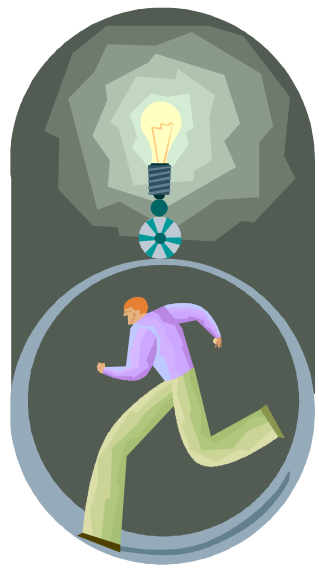
Need Tech Support?
Help is On The Way!

"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."

U.S. AIR FORCE

USGBC LEED™ Resources

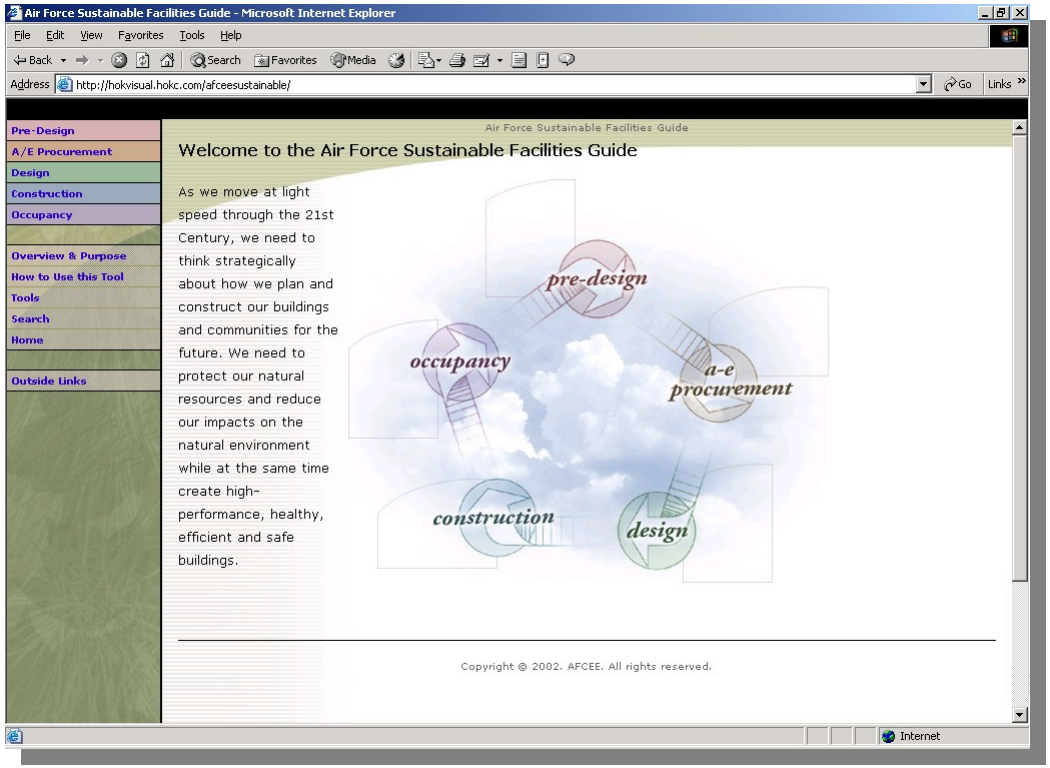
- LEED™ Rating Systems
- Training Workshops
- Professional Accreditation
- Welcome Packet
- Reference Package
- Credit Inquiries and Rulings
- Website – www.leedbuilding.org
- Email – leedinfo@usgbc.org



USAF Sustainable Facilities Guide

U.S. AIR FORCE

- **Web-based**
- **Process-focused tools and resources for the entire life cycle**
- **The Whole Building Design Guide (WBDG) provides *technical* resources to complement the *process* guidance in the USAF Guide**


Air Force Sustainable Facilities Guide - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://hokvisual.hokc.com/afceesustainable/
Pre-Design
A/E Procurement
Design
Construction
Occupancy
Overview & Purpose
How to Use this Tool
Tools
Search
Home
Outside Links
Air Force Sustainable Facilities Guide
Welcome to the Air Force Sustainable Facilities Guide
As we move at light speed through the 21st Century, we need to think strategically about how we plan and construct our buildings and communities for the future. We need to protect our natural resources and reduce our impacts on the natural environment while at the same time create high-performance, healthy, efficient and safe buildings.
pre-design
occupancy
a-e procurement
construction
design
Copyright © 2002. AFCEE. All rights reserved.
Internet

- **LEED™ Rating System used as organizational framework**
- **http://www.afcee.brooks.af.mil/dc/dcd/arch/rfg/index.html**

U.S. AIR FORCE

A Matrix Based on LEED™ ~~Credits~~

Air Force Sustainable Facilities Guide - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss

Address http://www.afcee.brooks.af.mil/dc/dcd/arch/rfg/index.html Go Links

AFCEE HOME | ORGANIZATIONS | SEARCH | PRODUCTS | PERSONNEL

Pre-Design
A/E Procurement
Design:
Concept Design; Design Development/ Documentation
Teams & Tools
Process Mapping
- 1. Sites
- 2. Water
- 3. Energy
- 4. Materials
- 5. IEQ
- 6. Innovation
Download (Entire Process Map)
Construction
Occupancy
Overview & Purpose
How to Use this Tool
Tools
Search
Home

Design: Process Mapping

3. Energy and Atmosphere

<< 1. Sites 2. Water 3. Energy 4. Materials 5. IEQ 6. Innovation >>

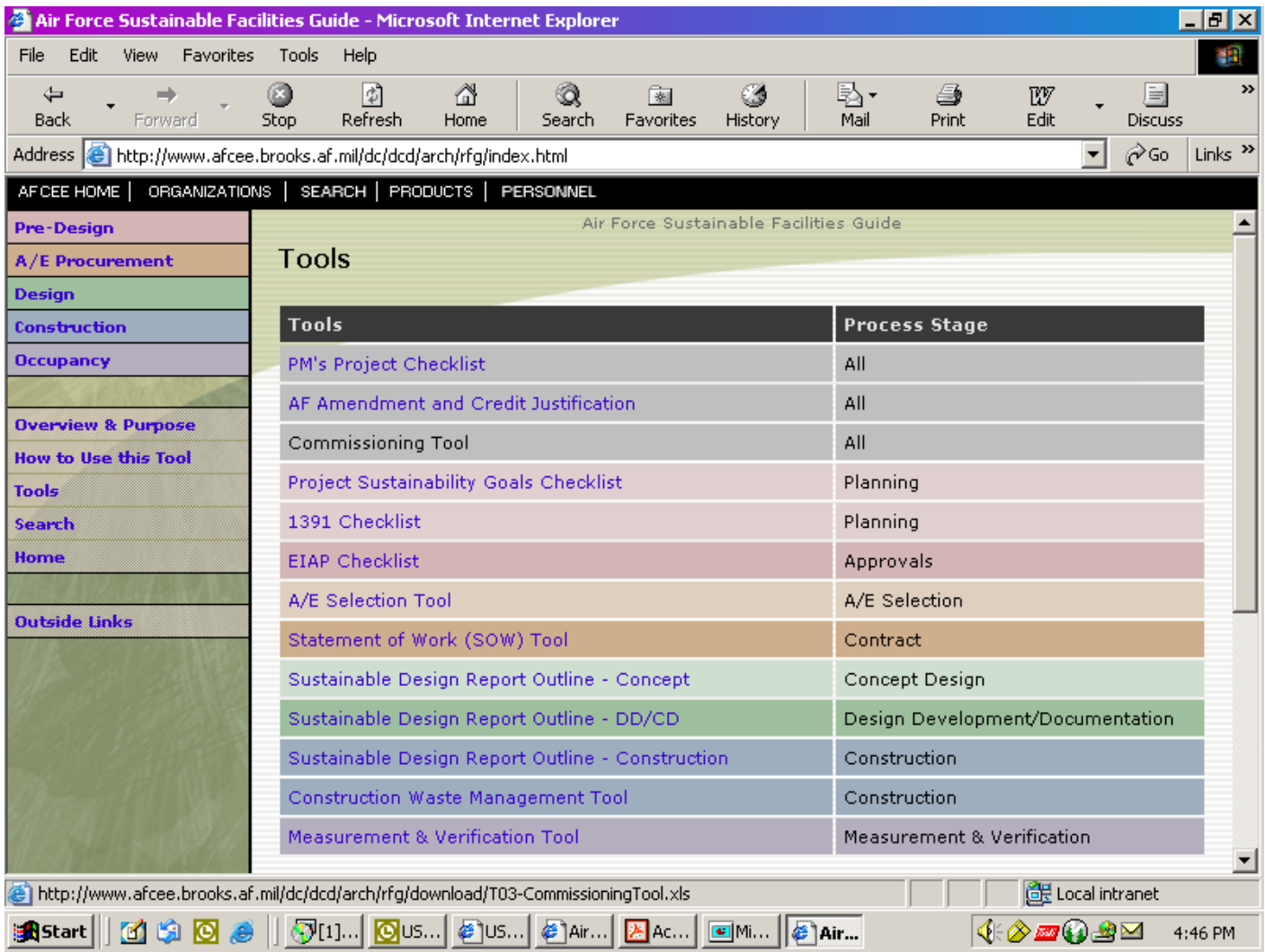
LEED Credit	LEED Points	Air Force Policy	Concept Design	Design Development / Documentation
Energy and Atmosphere Prerequisite 1 Fundamental Building Systems Commissioning	LEED™ Required	Highly Recommended	- Develop design intent and basis of design documentation.	- Include commissioning requirements in the construction documents.
Energy and Atmosphere Prerequisite 2 Minimum Energy Performance	Required	Highly Recommended		Document compliance with LEED™ criteria in appendix to the **Sustainable Design Report**: State whether the energy design process followed ASHRAE/IESNA 90.1-1999 or local energy codes. If local energy codes were applied.

Local intranet

Start [1]... US... US... Air... Ac... Mi... Air... 4:45 PM

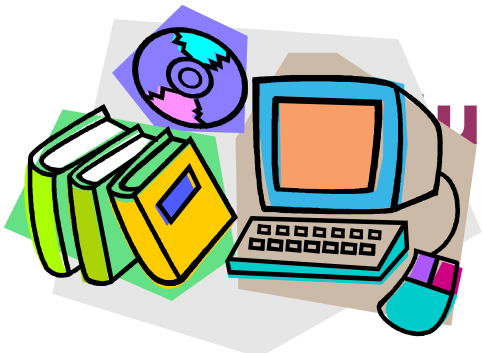
U.S. AIR FORCE

Other Tools Included in the Guide


Air Force Sustainable Facilities Guide - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss
Address http://www.afcee.brooks.af.mil/dc/dcd/arch/rfg/index.html
Go Links
AFCEE HOME | ORGANIZATIONS | SEARCH | PRODUCTS | PERSONNEL
Pre-Design
A/E Procurement
Design
Construction
Occupancy
Overview & Purpose
How to Use this Tool
Tools
Search
Home
Outside Links
Air Force Sustainable Facilities Guide
Tools
Tools | Process Stage
PM's Project Checklist | All
AF Amendment and Credit Justification | All
Commissioning Tool | All
Project Sustainability Goals Checklist | Planning
1391 Checklist | Planning
EIAP Checklist | Approvals
A/E Selection Tool | A/E Selection
Statement of Work (SOW) Tool | Contract
Sustainable Design Report Outline - Concept | Concept Design
Sustainable Design Report Outline - DD/CD | Design Development/Documentation
Sustainable Design Report Outline - Construction | Construction
Construction Waste Management Tool | Construction
Measurement & Verification Tool | Measurement & Verification
http://www.afcee.brooks.af.mil/dc/dcd/arch/rfg/download/T03-CommissioningTool.xls
Local intranet
Start
4:46 PM

U.S. AIR FORCE

Web University Training



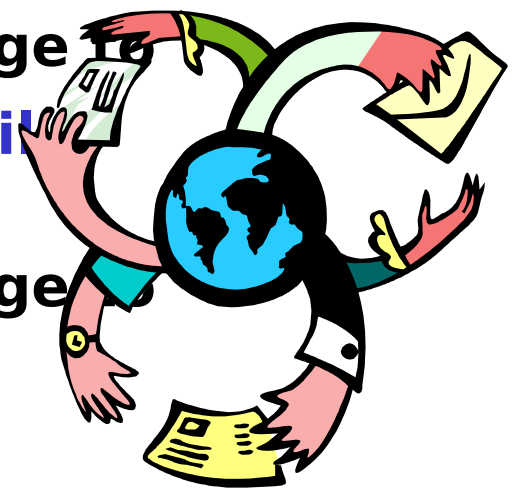
ustainable Development Course is now offered by the AFCEE Web University

- ***Target audience:*** *Major construction project managers and team members*
- ***Includes:***
  - Review of AF policy
  - Introduction to LEED-NC Version 2 Rating System
  - Overview of key sustainable development strategies
  - Discussion of implementation issues, teaming, integrated design process
  - Introduction to USAF Sustainable Facilities Guide
- *Available online at* **http://webu.brooks.af.mil/webu/**

U.S. AIR FORCE

Staying Connected

- **Use the DoD E-mail List Servers**
  - **Sustainable Development: "Sustain-Net"**
    To join, send a blank e-mail message to
    join-sustain-net@list.denix.osd.mil
  - **Green Purchasing: "Buy-Green"**
    To join, send a blank e-mail message to
    join-buy-green@list.denix.osd.mil



- **Contact AFCEE for assistance**

  Karen Kivela, AFCEE/TDD (environmental engineer)
  DSN 240-4191 or **karen.kivela@brooks.af.mil**

  Robert Fitzsimmons, AFCEE/TDD (architect – currently deployed)
  DSN 240-3485 or **robert.fitzsimmons@brooks.af.mil**

U.S. AIR FORCE

In Closing: Lessons from Noah's Ark